

Date: Tuesday, 1/15/2008 3:04:06 PM
 User: Kim Johnston

Process Sheet

Customer : CU-DAR001 Dart Helicopters Services Drawing Name : 212 X-TUBE ,LOW NARROW FWD
 Job Number : 36641
 Estimate Number : 13018
 P.O. Number :
 This Issue : 1/15/2008 S.O. No. :
 Prsht Rev. : NC Part Number : D212664107
 First Issue : 1/7/2008 Type : LANDING GEAR Drawing Number : D212-664-147 UR A
 Previous Run : 34637 Drawing Revision : UR A
 Material :
 Due Date : 2/5/2008 Qty: 1 Um: Each
 Written By :
 Checked & Approved By : 08.01.15
 Comment : Est Rev: A New Issue 07.09.12 EC verified by: JLM

Additional Product

Job Number:



Seq. #: Machine Or Operation: Description :

1.0 DC DOCUMENT CONTROL



Comment: DOCUMENT CONTROL

Photocopy bluefile and create labels as per PPP D212-664-107 CHG001

2.0 D6019128 Crosstube Material



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Pick:

Qty Part number Description Batch

1 D6019-128 Crosstube B 32310

Check OD = 2.750"; ID = 2.125"

3.0 MORI SEIKI MORI SEIKI CNC LATHE LARGE



Comment: 1-TURN AS PER FOLIO FA705 & DWG D212-664-147,

FOLIO REV: AADWG REV: A

2-DEBURR AS REQUIRED

4.0 QC2 INSPECT PARTS AS THEY COME OFF MACHINE



Comment: INSPECT PARTS AS THEY COME OFF MACHINE

5.0 QC8 SECOND CHECK



Comment: SECOND CHECK

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Tuesday, 1/15/2008 3:04:07 PM
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Drawing Name: 212 X-TUBE ,LOW NARROW FWD

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Seq. #: Machine Or Operation: Description :

6.0 LANDING GEAR 1 LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

AWM
08-01-23

1-Polish entire outside surface of crosstube

7.0 QC5 INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

BE 08/01/23

8.0 HAND FINISHING1 HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

9.0 QC3/5 INSPECT WORK/WING WALK



Comment: Inspect work & Chemical conversion Coat

BE 08/02/04

10.0 BENDING BENDING MACHINE



Comment: BENDING MACHINE

Bend tube as per Dwg D412-664-243 using CNC bender program 412-af and Folio FT010

EL/JD 8-2-5

11.0 QC6 DIMENSIONAL CHECK



Comment: DIMENSIONAL CHECK

CB-0206 (V)

12.0 D36591 CUFF



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

CUFF

Batch: B37426

EL 8-3-11

13.0 LANDING GEAR 1 LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1.0 cut tube to height EL/JD 8-2-7

1.1-Drill Rivet holes as per Dwg D212-664-147 using DT8972.

2-Drill pilot holes in tube as per Dwg D212-664-147

3-Ream hole to finish size in tube as per Dwg D212-664-147

JAM/K 8-2-12

W/O:		WORK ORDER CHANGES					
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Drawing Name: 212 X-TUBE LOW NARROW FWD

Job Number: 36641

Part Number: D212664107

Job Number:



Seq. #:

Machine Or Operation:

Description:

4-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D212-664-147

AWM 08-02-20

14.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



AWM

8-2-20



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat Tube & Cuffs as per QSI 005 4.1

15.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Jan 22 11



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

16.0

QC5

INSPECT WORK TO CURRENT STEP



Jan 22 11



Comment: INSPECT WORK TO CURRENT STEP

17.0

OUTSIDE SERV.10

OUTSIDE SERVICES -LG



Comment: Sub-Contracting OUTSIDE SERVICES

Liquid Penetrant Inspection as per QSI 038Or

Issue P/O: 5781 LPI as per ASTM 1417

Level 2 Attach copy of NDT results to work order

C 208/02/25 11

18.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Inspect for transit damage

Ensure copy of NDT results attached to work order.

Pick 22 11

19.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: Inspect for damage & ensure results are as per Dwg D412-664-203

2 06/03/11 11

20.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Rivet Cuffs as per Dwg D212-664-147. with Sika flex in Between tube & Cuff

A/R SIKAFLEX -241/291 BATCH: MIOSS9S

EXP 8-7-31

M 8-3-13

W/O:		WORK ORDER CHANGES					
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Job Number:



Seq. #:

Machine Or Operation:

Description :

21.0

CR3212406

CHERRY RIVET



Comment: Qty.: 44.0000 Each(s)/Unit Total : 44.0000 Each(s)

CHERRY RIVET

Batch: M107376

45

16

8-3-13

22.0

SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside and outside crosstube as per QSI 005 4.2

2-Paint outside crosstube with White Imron as per QSI 005 4.2

ml 08 03 17

1

23.0

QC14

INSPECT SPRAY PAINT



Comment: Inspect Spray Paint

Wrap in plastic bag to protect from scratches

2T 08 03 18

24.0

D28931

Support



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Support

B-33579

2T 08 03 18

25.0

D3595

Rubber Cushion (per sq ft)



Comment: Qty.: 0.8295 sf(s)/Unit Total : 0.8295 sf(s)

Rubber Cushion

Cut to .630" X 4.5" Qty 4

Batch: 35124

2T 08 03 18

26.0

MS2192025

Clamp(per MIL-DTL-8783C)



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Clamp

Batch: 107236

2T 08 03 18

27.0

AN635A

BOLT



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

BOLT

batch M106242

8-2/17

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

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Drawing Name: 212 X-TUBE LOW NARROW FWD

Job Number: 36641

Part Number: D212664107

Job Number:



Seq. #:

Machine Or Operation:

Description :

28.0

AN636A

Bolt



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)
Bolt
batch M106883

29.0

MS21042L6

Nut



Comment: Qty.: 6.0000 Each(s)/Unit Total : 6.0000 Each(s)
Nut
batch M105077

30.0

AN960JD616

Washer



Comment: Qty.: 18.0000 Each(s)/Unit Total : 18.0000 Each(s)
Washer
batch M106833

31.0

D34281

Placard



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)
Placard
batch 37088

32.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1
Assemble as per Dwg D212-664-147

Instal support with magnobond 6398 per dwg D212-664-147,
cure for 12hrs before packaging.

Time & date of application: 106695 08-03-18 5:00
Batch: 106695

ET 08-08-18

33.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

5

PL

ET 08/03/20 (PL)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes ☒ No ☐ DQA: A Date: 08/03/20
 QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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Job Number: 36641

Part Number: D212664107

Job Number:



Seq. #:

Machine Or Operation:

Description :

34.0

PACKAGING 1

PACKAGING RESOURCE #1



Draft



Comment: HAND FINISHING RESOURCE #1

Identify and pack for shipping as per PPP D212.664-107

8/3/20

sq

(M)

35.0

QC21

FINAL INSPECTION/W/O RELEASE



(1)

Comment: FINAL INSPECTION/W/O RELEASE

A 08/03/20

Job Completion



h 08-03-20

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD		Work Order:	36641
Description: Crosstube Assembly (205/212/412 Low Fwd)		Part Number:	D212-664-147
Inspection Dwg: D212-664-147 Rev: A		Page 1 of 1	

FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article
 ☐ Prototype

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.360						
	2.360						
	2.366						
	2.473						
	2.573						
	2.673						
SIDE B							

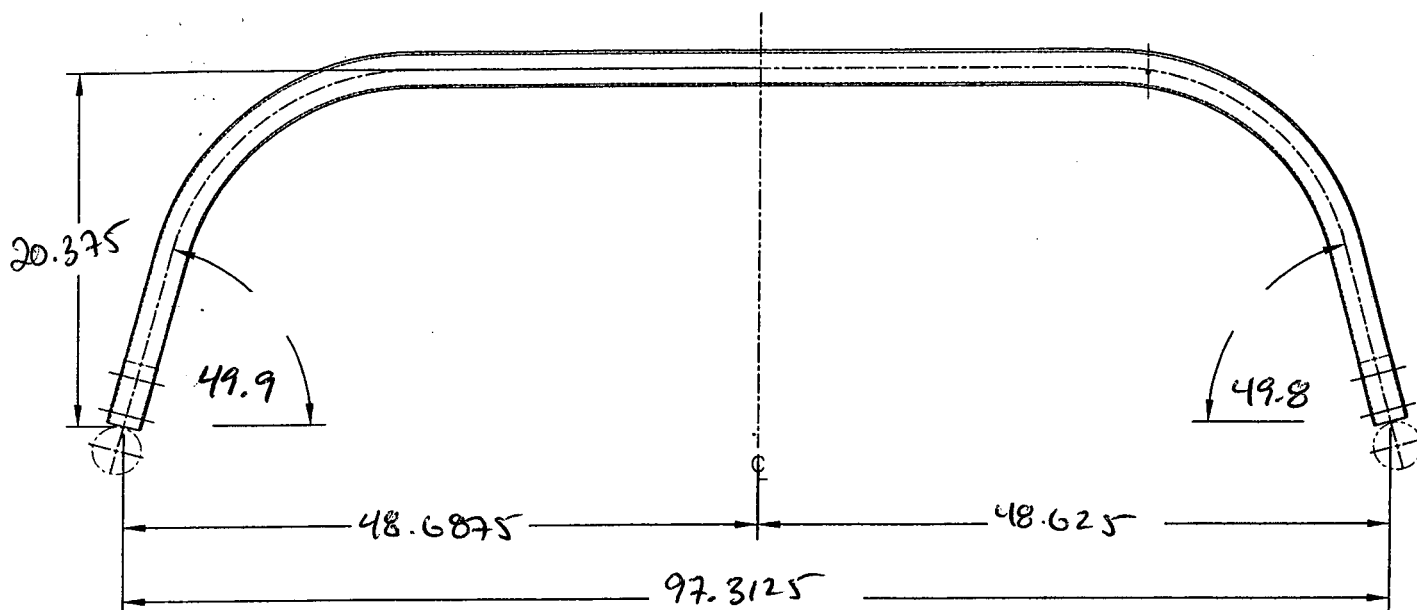
Measured by:	Audited by:	Prototype Approval:	N/A
Date:	Date:	Date:	N/A

Rev	Date	Change	Revised by	Approved
A		New Issue (P/O D212-664-107)	KJ/EC/DD	

DART AEROSPACE LTD		Work Order:	36641
Description: Crosstube Low Fwd (205/212/412)		Part Number:	D212-664-107
Inspection Dwg: D212-664-147 Rev: A		Page 1 of 1	

Required Dimension	Min	Max
Height	20.79	21.05
1/2 Span	48.55	48.81
Angle	49	52
Total Span	97.1	97.62

3/2



Comments

QC15 Inspection	
Date	08-02-06

Rev	Date	Change	Revised by	Approved
A		New Issue		

PARTS LIST:

Qty	Part Number	Description
X	D212-664-147	CROSSTUBE ASSEMBLY (205/212/412 LOW FWD)
1	D6019-128	CROSSTUBE
2	D2893-1	SUPPORT
4	D3595-063-450	RUBBER CUSHION
2	D3659-1	CUFF
4	MS21920-25	CLAMP (OR MS21920-26)
44	CR3212-4-06	RIVET (OR M7885/3-4-06)
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
A/R	SIKAFLEX-241/-291	SEALANT (OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT)

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6019-128
FINISHED LENGTH = 126.53±0.020 (BEFORE BENDING/TRIMMING)
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) ALL DIMENSIONS ARE IN INCHES
- 5) PART IS SYMMETRIC ABOUT CENTERLINE.
- 6) WHEN MACHINING TAPER, RUN-OFF PART AT STOCK. BLEND OUT EDGE LONGITUDINALLY,
TRANSITION SHOULD BE SMOOTH.
- 7) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE
TO BENDING IS 6% BASED ON O.D., EXCEPT UP TO 10% IS ALLOWED IN AREA NOTED.
- 8) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 9) SCRIBE DART PART NUMBER AND BATCH NUMBER ON INNER SURFACE OF TUBE WITH A
VIBRATING STYLUS.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS
SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT
LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893-1
THAT WILL BE IN CONTACT WITH THE CROSSTUBE. LET CURE FOR 12 HOURS AFTER
INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-25 CLAMPS (OR -26) WITH D3595-063-450 RUBBER CUSHIONS TO SECURE
D2893-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE
CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN.-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY
AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 14) INSTALL D3659-1 CUFF AFTER CHEMICAL CONVERSION COAT BUT BEFORE PAINT, WITH A
LAYER OF SIKAFLEX-241/-291 OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT BETWEEN
CUFF AND CROSSTUBE. SEAL EDGE OF CUFF TO ENSURE NO GAPS.
- 15) TOUCH-UP HOLES WITH CHEMICAL CONVERSION COAT.

RELEASED
07.07.07

NO. 36641
WORK ORDER
SUBJECT TO AMENDMENT
WITHOUT NOTICE
UNCONTROLLED COPY
ENGINEERING
RETURN TO
SHOP COPY

A		07.07.07	NEW ISSUE
DESIGN	q	DRAWN BY	q
CHECKED	q	APPROVED	q
DATE		07.07.07	
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		CROSSTUBE (205/212/412 LOW FWD) NTS	

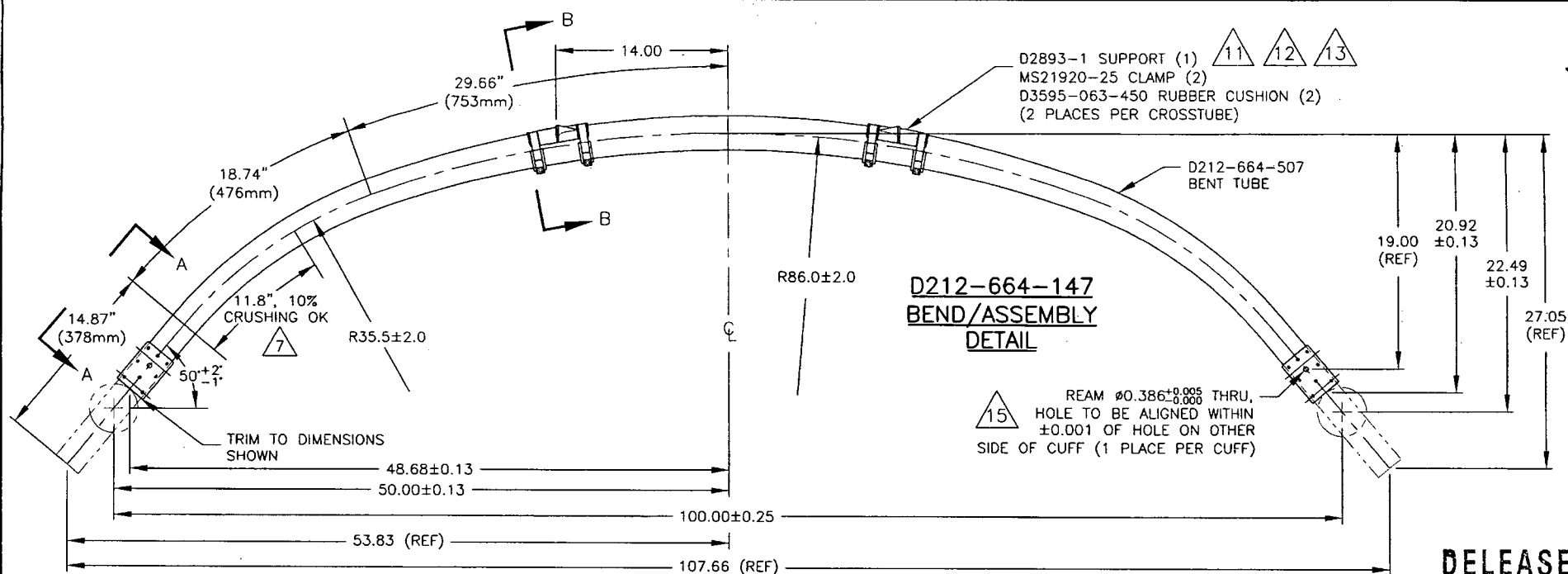
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

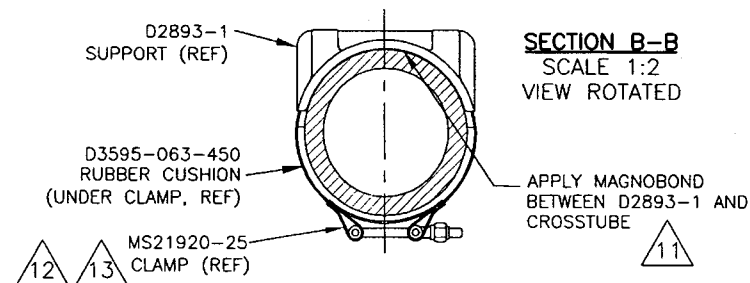
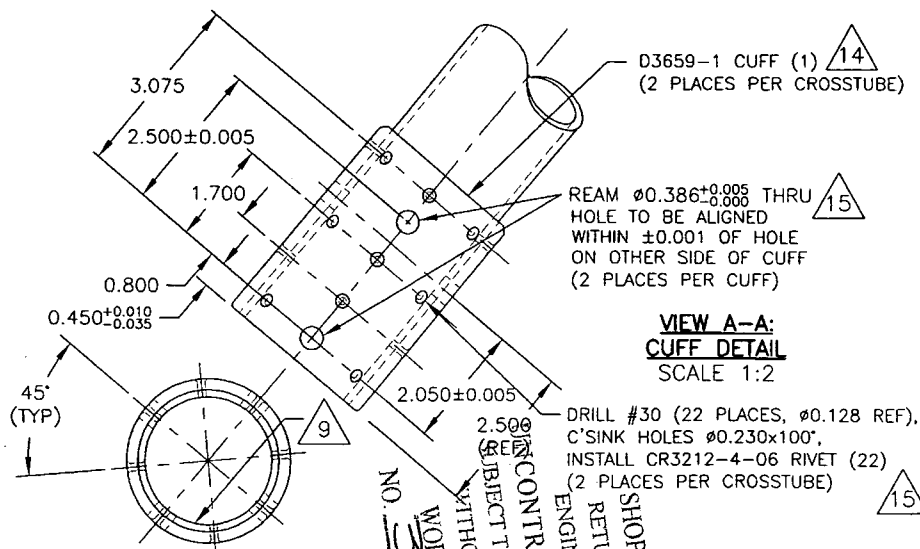
QA: N/C Closed: _____ Date: _____

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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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NOTE: Date & initial all entries



RELEASED
07.07.07



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DESIGN <i>qp</i>	DRAWN BY <i>qp</i>	DART	DART AEROSPACE LTD. HAMPSHIRE, ONTARIO, CANADA
CHECKED <i>ph</i>	APPROVED <i>ph</i>	DRAWING NO. D212-664-147	REV. A SHEET 2 OF 3
DATE 07.07.07	TITLE CROSSTUBE (205/212/412 LOW FWD)	SCALE 1:8	

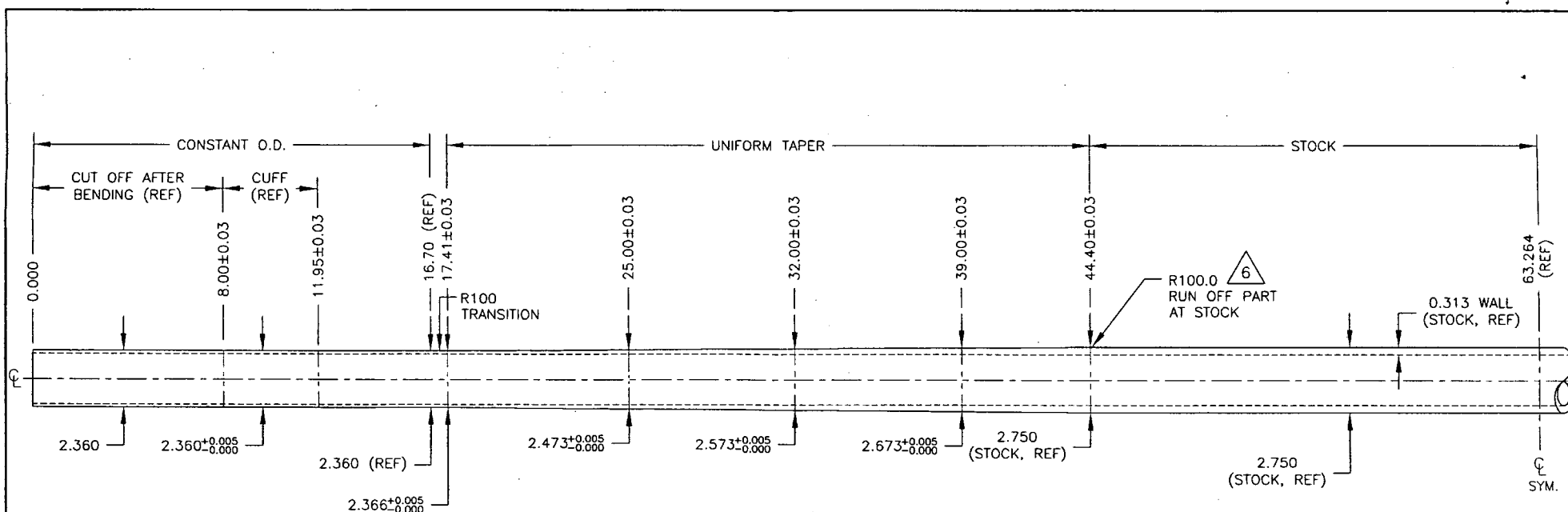
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NOTE: Date & initial all entries



D212-664-147 MACHINING DETAIL

RELEASED
07.07.24

NO. 36641
WORK ORDER
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SUBJECT TO AMENDMENT
WITHOUT NOTICE
ENGINEERING
RETURN TO
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DATE 07.07.07		TITLE CROSSTUBE (205/212/412 LOW FWD)		SCALE 1:4	

W/O:		WORK ORDER CHANGES					
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DART AEROSPACE LTD		Work Order:	36642
Description: Crosstube Assembly (205/212/412 Low Fwd)		Part Number:	36641 D212-664-147
Inspection Dwg: D212-664-147 Rev: A		Page 1 of 1	

FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article
 ☐ Prototype

Inspection Sheet	Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.360	±.010	2.360	✓			
	2.360	±.005 +0.000	2.364	✓			
	2.366	"	2.369	✓			
	2.743	"	2.746	✓			
	2.573	"	2.574	✓			
	2.673	"	2.675	✓			
SIDE B	126.53	±.020	126.54	✓			
	2.360	±.010	2.361	✓			
	2.360	±.005 +0.000	2.365	✓			
	2.366	"	2.370	✓			
	2.743	"	2.746	✓			
	2.573	"	2.575	✓			
	2.673	"	2.674	✓			

Measured by: <i>BE</i>	Audited by: <i>J.F.</i>	Prototype Approval:	N/A
Date: 08.01.21	Date: 08/01/22	Date:	N/A

Rev	Date	Change	Revised by	Approved
A		New Issue (P/O D212-664-107)	KJ/EC/DD	



LIQUID PENETRANT TEST REPORT

P - 1253 1

CLIENT	DART AEROSPACE	DATE	FEB 22 2008	PAGE	1	OF	1
ATTENTION	LINDA LACELLE	ACUREN JOB No.	188 08 1253	TIME	AM <input type="checkbox"/>	PM <input type="checkbox"/>	
ADDRESS	1270 ABERDEEN ST	PO/VO No.					
	HAWKESBURY, ONT.	WORK LOCATION	HAWKESBURY				
		ACCEPTANCE STD.	ASTM 1417/QSI-038	REV./DATE	2005		
PROJECT	212 LOW NARROW FWD, 407 HIGH AFT, 212/205 HIGH FED X TUBES						
ITEM(S) EXAMINED	JOB #'S 212-36641, 36643, 36772, 407-37008, 212/205-37271, 37274.						

JOB DESCRIPTION	PROCEDURE No.	LT-0002	REV./DATE	TECHNIQUE No.	LT-TECH2	REV./DATE
'PART No.	D212664107/D407667205/D212664101		MATERIAL	ALODINED ALUM.		THICKNESS
SCOPE	WET FLOURESCENT LIQUID PENETRANT INSPECTION CARRIED OUT ON 100% EXTERNAL SURFACE					

TEST DETAILS

METHOD	<input checked="" type="checkbox"/> FLUORESCENT	<input type="checkbox"/> VISIBLE	<input checked="" type="checkbox"/> WATER WASH	<input type="checkbox"/> SOLVENT REMOVABLE	<input type="checkbox"/> POST EMULSIFIED
FAMILY BRAND	MAGNAFLUX		BLACK LGHT8171	<input type="checkbox"/> OUTPUT > 1000 μ W/cm ²	<input type="checkbox"/> AMBIENT < 2 fc
PENETRANTZL67	MINIMUM DWELL TIME	45 MIN.	LIGHTING EQUIP.	<input type="checkbox"/> FLASHLIGHT	<input type="checkbox"/> TROUBLELIGHT
PENETRANT REMOVER	H2O	MINIMUM DRY TIME	>10 MIN.	OTHER	CAL SEP 18 07
DEVELOPER	SKDS2	MINIMUM DWELL TIME	10 MIN.	LIGHT METER S/N	CAL DUE DATE
DEVELOPER TYPE	<input checked="" type="checkbox"/> NON AQUEOUS	<input type="checkbox"/> AQUEOUS	<input type="checkbox"/> DRY		

TEST SURFACE

SURFACE CONDITION	<input type="checkbox"/> AS GROUND	<input checked="" type="checkbox"/> AS WELDED	<input type="checkbox"/> MACHINED	<input type="checkbox"/> SHOT BLASTED	<input checked="" type="checkbox"/> CLEAN BARE METAL
SURFACE TEMPERATURE	<input type="checkbox"/> < - 4°C/ 20°F	<input type="checkbox"/> - 4°C/ 20°F TO 10°C/50°F	<input type="checkbox"/> 10°C/50°F TO 52°C/125°F	<input type="checkbox"/> > 52°C/125°F	

RESULTS- (☐ METRIC ☒ IMPERIAL)

FLUORESCENT LIQUID PENETRANT INSPECTION

CARRIED OUT ON 100% EXTERNAL

SURFACE ON:

212 LOW NARROW FWD X TUBE JOB#S:

36641, 36643, 36772.

404 HIGH AFT X TUBE JOB: 37008

212/205 HIGH FED X TUBE JOB#S: 37271, 37274

RESULTS: NO INDICATION OF DEFECTS.

ITEMS ACCEPTABLE TO STANDARD

Scope of Services

The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner operator and the owner operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

SIGNATURES

CLIENT REPRESENTATIVE		DTR # E21515	
TECHNICIAN (SIGNATURE):		REPORT REVIEWED BY:	
NAME (PRINT):	JASON HEWETT	NAME INITIALS	
	1 ST TECHNICIAN		
CGSB LEVEL	2	SNT LEVEL	
CGSB REG. No	6156	CGSB REG. No	

WHITE - CLIENT COPY

CANARY - OFFICE COPY

PINK - TECHNICIAN COPY

GOLD - OFFICE COPY

